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Race and Turnout

by

Carol W. Kohfeld
University of Missouri - St. Louis

and

John Sprague
Washington University in St. Louis


Abstract

Urban politics in St. Louis is driven by race. For several decades the city of St. Louis has been nearly evenly divided between blacks and whites. Other ethnic minorities have accounted for two percent or less of the population over this same period. The geographic distribution of race exhibits a high level of segregation - blacks on the North side, whites on the South side, and a mixture of whites and blacks in the central corridor between north and south. These racial enclaves behave quite differently in city politics and separating them for analysis provides additional purchase on the structure of electoral mobilization. Turnout in a Democratic primary election (1989) and a non-partisan School Board election (1991) are studied here with the same precinct coverage. Demographic covariates used in the analyses are taken from the Census (1990) and several measures were constructed by allocation from block groups, to blocks, and then back to the precinct level by means of a concordance between the blocks and the precincts. Geographic tools (maps and spatial correlograms) are used throughout and extensive use is made of graphic visualization of these data. The end results show that count models utilizing a small number of Census measures as predictors defend themselves well, provided that race is controlled systematically.
This paper reports on voting participation in two elections from the last century - a partisan election (a Democratic primary in 1989) and a non-partisan election (for School Board members in 1991) in St. Louis City. The same voting precincts provide the reporting units for the votes, reapportionment had not yet occurred at the time of the School Board election, and our principal interest centers on evaluating the relationship of participation to the racial organization of the city geographically and politically. In the School Board non-partisan election the voter turnout was nearly 10,000 participants higher than turnout in the Democratic primary for Comptroller (66,952 compared with 57,205). This increased participation was largely concentrated in the South side (white) precincts. The elections are separated by about two years and they bracket the 1990 Census from which we have obtained the demographic covariates used in our analyses.

The Census counts, except for the fully enumerated items, are not organized by voting precinct and allocation algorithms were used to assign measures from the Census available only at the block group level down to the block level and then reaggregated to the voting precincts. Table 1 sets out the correlations for a handful of typical co-variates in the original block group data and then in the allocated precinct data. One pair of correlations in the table are available from the Census full enumeration - marriage rates and those over age 65 - while the remaining four measures required allocation. Because the precincts are larger units (more people) than the block groups, some increased strength of correlation can be anticipated from increased smoothing of within variation due to the aggregation. A comparison of the two correlation matrices indicates that this slight enhancement of correlation strength holds for most cells. Only three cells are reversed and the magnitudes of the differences are small. Furthermore, the signs of the covariation hold for each cell without exception. We conclude that the allocation has not done grave injustice to the Census measures and the pattern of their interrelationships.

The behavior of interest is overall voter turnout and voter mobilization for particular candidates. We start with a display of overall voter turnout in the Comptroller's Democratic primary expressed as a function of neighborhood stability. Neighborhood stability is proxied by the percentage of persons five years and older who are at the same address as five years earlier - a standard Census measure. It is reasonable to expect a positive relationship for such a scatter and Figure 1 holds no surprises - increased neighborhood stability is accompanied by increased voter participation. The curve imposed is a Loess smoother but with span of one and degree of one as well, essentially a straight line fit in this case. Loess smoothers are used extensively in the remainder of the paper sometimes with settings designed to capture more local structure in a scatterplot. The fit to the Loess curve computed from squared deviations from the line is about 19 percent.

Confronted with the scatter in Figure 1 there is no compelling reason to believe that the behavior is driven by race. In particular, no obvious clustering of observations indicates that there are white and non-white groups contributing to the pattern in
strikingly different levels of support for different candidates. The relationship of turnout to neighborhood stability is relatively sturdy. If household income and marriage rates, two measures weakly and positively related to turnout, are used as conditioning shingles there is little effect on the relationship of turnout to neighborhood stability (see Figures 2 and 3). Figure 2 shows that with a 50 percent overlap in the conditioning shingles the data support in each panel is adequate. Accordingly the data scatter can be suppressed, as in Figure 3, in order to make the smoothed curves stand out. Two other measures that are weakly and positively related to turnout are the percent owner occupied housing units and the percent of the population age 65 or older. When these are used as conditioning shingles the dependence of turnout on neighborhood stability is not compromised (see Figure 4). In a linear model predicting turnout based on the shingle source variables and neighborhood stability, stability becomes marginal (t probability of .13) with the others remaining crisp. Other, perhaps more appropriate multivariate statistical models indicate neighborhood stability should be retained as a predictor. (Numerical detail is given in an appendix.)

When a candidate’s race is isolated as turnout specific to that candidate, for example the mobilization of adult voters for the black candidate Jones in the Comptroller’s contest, the underlying racial organization of politics is quickly revealed. A striking demonstration of this effect also can be obtained from the School Board election. In this non-partisan contest two slates competed pretty much head to head. Four seats on the School Board were available for contesting and a group of potentially liberal reformers organized a slate, Four for Kids, filed first to get the first four ballot positions, and ran their campaign as a slate. Many commentators and active politicians thought that the slate idea would not work, that it would be too difficult to teach the voters how to vote a slate in this non-partisan election. The response of this group was "Punch 1, 2, 3, and 4." The Four for Kids slate consisted of a white male, a black male, a white female, and a black female. Four white candidates touting neighborhood schools opposed the Four for Kids. In the event, the Four for Kids were successful. Analysis of the votes for the candidates reveals that voters did vote the slates in this School Board election. In fact, this pattern is so regular that an analysis of the election can be obtained by analyzing one candidate from each slate. We use Davis from the Four for Kids and Macke from the opposition slate. When the total school board election mobilization is broken down by candidate, the underlying significance of race emerges clearly.

Davis mobilization is scattered on neighborhood stability in Figure 5. The scatter shows greater dispersion than does the total turnout in Figure 1 but the underlying racial distribution is not obvious. However, a similar scatterplot for the opposition slate candidate Macke clearly shows the grouping induced by race (see Figure 6). The bifurcation is sharply revealed by the location of the Loess smoothed curve. The curve lies precisely where the data are not located. Where did all that very low Macke turnout come from? Not too surprisingly, Macke’s lack of support is located on the mostly black (operationalized here as non-white) North side of St. Louis. The important inference to be drawn is that analysis requires paying attention to race.

[Insert Figures 5 and 6 about here.]

Our data are spatial. Hence peculiarities in the spatial distribution of a relevant quantity like race is consequential for all analyses. And the distribution of race in St.
Louis is striking in its spatial structure. Several visualizations make this clear. A histogram of the non-white percentage age 18 and over is set out in Figure 7. As histograms go it is dramatic. Although the non-white population constitutes nearly half of the city's population there is a marked white/non-white age difference and the non-white population pays a penalty in the voting age population. The non-white percentage for those age 18 and over is slightly under 44 percent. This is a modest handicap and the race distribution is sufficiently close to 50/50 so that electoral politics, and politicians as well, can not afford to be indifferent to either large grouping. The Comptroller's race turns out to illustrate this proposition quite clearly.

Figure 7 provides one picture of racial segregation in living patterns. An alternative view can be obtained, a complement to the histogram, by constructing a shingle without overlapping categories for the percentage non-white in the adult population. Each category contains approximately ten percent of the precincts and the numerical details for the cutting points are reported in Table 2. The shingle is plotted in Figure 8.

Figures 7 and 8 provide compelling portraits of racial segregation and Table 2 reveals that about 60 percent of all precincts are either less than 5 percent non-white or more than 95 percent non-white. This spatial organization is vivid on a map and a spatial correlogram based on an elementary spatial statistic, Moran's I, supplies a quantification of the spatial structure in terms of gradations of propinquity. We have constructed contiguity matrices for this purpose through neighborhood order ten (in S-PLUS, starting with an ArcView shape file to obtain a sparse format matrix of first order connections from Luc Anselin's SpaceStat). For the initial map display we use customary cutting points for percent non-white of 10 and 90. These cutting points are close to those obtained for 3 quantiles. Figure 9 displays the city map of precincts shaded for the three categories of non-white with Ward boundaries overlaid and Figure 10 displays the spatial correlograms for both Moran's I and the Pearson correlation coefficient for percent non-white. Numerical details for the correlograms are given in Table 3.

It is worth noting that the values of Moran's I in Figure 10 are very high for first order neighbors and the association as neighborhoods become more distant fades slowly. The spatial organization of race is close to an ideal of high levels of spatial organization. The concentrations at the white and non-white ends of the racial spectrum and the wide gradient between them point to the advisability of dividing the analyses into thirds. Before doing so the spatial structure of total turnout in the two elections can be exhibited and compared with the spatial structure for race in Figure 10. The correlograms for overall turnout in the Comptroller's race are given in Figure 11 and for turnout in the School Board election in Figure 12.
There is a striking difference in the spatial organization of turnout in the two elections, and a sharp contrast between either election turnout pattern and the spatial organization of race. Two comments seem worthwhile. First, from a technical perspective, the spatial correlograms inform intuition as the maps are inspected. The message from the correlograms of turnout can be put this way: Where are those clumps of contiguous spatial organization in turnout behavior? What do they mean substantively? The turnout maps corresponding to the correlograms are set out in Figures 13 and 14. What apparently produces the difference in the correlograms is that the highest levels of participation in the School Board election are disproportionately located on the South side. In the Comptroller’s race by contrast there is a grouping on both the North and South sides of comparable magnitudes. And these groupings are widely separated in space as the Comptroller’s turnout map shows - perhaps revealing a weakness in the analytic statistics from the correlograms. On the other hand, the correlograms do suggest what sort of features or patterning might be found in the maps.

Second, from a substantive perspective, why is the School Board turnout more highly organized spatially than that for the Comptroller’s race? We had anticipated precisely the reverse, i.e., that a primary election, with candidate political organizations functioning and potential rewards for the friends of winners, would be substantially structured spatially (especially by ward organizations) as compared with the spatial structure of the non-partisan election (no readily available ward party machinery). It may be true that spatial structure in the residuals of a multivariate statistical model of some measure of party politics does reflect the unmeasured significance of party candidate mobilization efforts - their personal machines (Kohfeld and Sprague 1995). However, in light of the contrary evidence from Figures 11 and 12, it is perhaps more plausible to see the School Board election as reflecting a social basis for voter mobilization - the tendency for families with children to live together or the strong organization of parochial schools or religious congregations. An appropriate strategy would be to enrich the analysis of spatial organization by using measures that capture local clustering instead of the global patterns picked up by Moran’s I and the Pearson correlation (Anselin and others, 1988, 1992, 1994a, 1994b, 1995a, 1995b). Measures of local clustering, by hypothesis, would pick up pronounced local clustering in the Comptroller’s race (candidate and ward organization) but detect much less local clustering in the School Board turnout patterns. This remains a program for future work.

Our strategy for partitioning the precincts into three sets is based on the map in Figure 9. With the reclassification of a relatively small number of precincts (11 out of 384), three connected subsets of precincts can be obtained. On the North side a compact set of non-white precincts (greater than 90% non-white) can be formed. On the South side a slightly less compact set of mostly white precincts (greater than 90% white) can be constructed. In the middle of the city and running up the East side along the Mississippi River toward the far North tip a gerrymandered set of precincts, not very compact, forms the residual mixed race subset. With these changes the city can be decomposed into the three shapes assembled in Figure 15.
The behavior of the voting age adults is distinctive across the three racial areas and between the two elections. In the School Board non-partisan election the white area had a turnout rate of 29 percent compared with a non-white area rate of 23 percent. The mixed area dropped in participation to 18 percent. A similar pattern holds in the Comptroller's election but with a marked decrease in white area participation. Turnout in the Comptroller's contest was 21 percent for the white area, 22 percent for the non-white area, and 18 percent in the mixed area. Thus the mixed area has a marked lower rate of adult participation in both elections, the non-white area turnout exceeded the white area turnout in the partisan primary, and something caused a marked increase in mobilization for the white area on the South side in the School Board election. In proportional terms the white area increased participation between the two elections a whopping 38 percent.

A natural question in this spatial context is to inquire to what extent turnout behavior retains its spatial structure within these racially distinct precinct subsets? The spatial structure in the subsets, as assessed by Moran's I, reveals substantial patterning. The magnitude of the first order coefficient (Moran's I) for the Comptroller's race is markedly higher in each subset than it was for the entire city - in order, from white to non-white, 0.30, 0.29, and 0.22 to be compared with 0.10 for the overall set of precincts. These differences seem large to us. For the School Board turnout the overall coefficient was 0.29 and the subset coefficients are 0.37, 0.32, and 0.43 - all larger. For the white and mixed areas, moving from School Board turnout to the Comptroller's turnout shows a small reduction in spatial structure. For the non-white areas, however, the coefficient is all but cut in half. The crude control on race obtained by dividing the precincts into three subsets shows slightly increased structure for School Board turnout in all three areas, substantially increased structure in all three areas for Comptroller turnout, and the correlograms indicate that the reach of neighborhood effects fades at different rates in the different areas with the white areas showing the most gradual pattern of reduction in spatial association as contiguity order increases. Evidence for these interpretations are given in correlograms for Moran's I through neighborhood order six in Figures 16 and 17. Apparently the spatial structure of participation is different in the non-white areas compared with either the mixed or white areas.

[Insert Figures 16 and 17 about here.]

Even without a racial signal, i.e., lumping all participatory voting together, the division by race shows an interaction between race and the spatial organization of turnout. What happens to turnout and neighborhood stability when a racial control is introduced? The covariation holds up, as Figure 18 shows, where a shingle of 9 non-overlapping quantiles of non-white percentage is used as a conditioning measure.

[Insert Figure 18 about here.]

Thus, even though there is an interaction between the spatial structure of turnout and race, a racial conditioning measure does not control away the response of turnout to neighborhood stability. What happens when candidate mobilization is easily racially marked? The mobilization for Virvus Jones in the Comptroller's election provides an example.

Vince Schoemehl, a white mayor of St. Louis, wanted another term in office and made some arrangements to make his re-election more likely. In a complex maneuver designed to secure some support from the black community Schoemehl manipulated the Democratic primary for himself and black candidate for Comptroller, Virvus Jones. The
status quo ante for Schoemehl was a current Comptroller, a white man named Berra, who was involved in a scandal concerning cable television. It was clear to the Democratic leadership (and to Berra as well) that Berra could not run for re-election. Schoemehl was concerned that a black candidate for mayor, Roberts, would consolidate support on the North side and perhaps keep Schoemehl from being re-nominated. Schoemehl then concocted a deal with the North side Clay (a black Congressman) machine along the following lines.

Schoemehl persuaded Berra to resign as city Comptroller. Virvus Jones also resigned as city assessor. The mayor had appointive power over these offices when they were vacated. Jones was appointed Comptroller thus allowing him to run for nomination in the primary as an incumbent. Berra was appointed to Jones's assessor's office. Then Schoemehl and Jones announced they were running as a slate for nomination by the Democratic party (with the hope on Schoemehl's part that the Clay machine would not actively help Roberts, Schoemehl's black opponent, and would help Jones and thus, sub silentio perhaps, help Schoemehl). However, a son of a former Democratic mayor, Conway, knew of the Berra scandal and anticipated that this was his chance for elective city office. Conway filed for the Comptroller's Democratic party nomination and this damaged Schoemehl's scheme. Jones now had serious opposition, and this might hurt Schoemehl as well, given the slate posture they had adopted. Rescue for Jones arrived in the form of a second substantial white candidate for the Comptroller's nomination named Percich (whose deceased father had been Comptroller and whose mother worked for the city) who many thought was persuaded to enter the nomination race by Schoemehl in order to divide the white vote thus allowing Jones to win. These machinations are worthy of Byzantium. In the event, the scheme worked. Schoemehl and Jones won their nominations and were certified in the pro forma general election. Schoemehl, it turned out, won his nomination with a majority but Jones won his nomination with less than a majority of the votes indicating that perhaps Schoemehl's fears, on behalf of Jones at least, were well founded. The white vote divided between Conway and Percich enabling the Jones victory.

Voters are mobilized for particular candidates probably for the most part never distinguishing between a decision to vote and a decision to vote for a particular candidate, however analytically convenient or necessary this distinction may be. This lack of distinction between turnout and choice is probably more important in the sort of election before us than in national presidential campaigns. Measuring the support for a candidate, like Jones, by expressing his vote relative to adults captures the joint character of this behavior and it is termed mobilization here. Jones was identifiable as a black candidate and Conway and Percich as white candidates. The race of the candidates was the easiest signal available to voters to distinguish between Jones and the two white candidates. However, it turns out that the two white candidates had differential class appeal as we show below.

Nevertheless, overwhelmingly, white voters voted for white candidates and black voters voted for black candidates in these St. Louis City elections. This tendency is so strong that, when coupled with the sharp patterns of segregation in living, analysis becomes more difficult. On the North side, any candidate who receives substantial voting support gets it from black voters, and on the South side any candidate with substantial support is receiving it from white voters. In these areas the minority candidate, white or black, typically receives very low levels of support. The analytic difficulty is further enhanced because a large number of demographic measures with
some predictive power are systematically correlated with race in a strong fashion. For example, there are substantial differences in adult population age groupings between North and South, and in household incomes, and in marriage rates. Since these are relevant characteristics for predicting the support of candidates in the two elections under consideration here the analyst may easily mistake a substantial negative or positive model coefficient for a substantive effect when mostly it describes a correlation of the measure with race. The bi-modal distribution of race thus further taints these useful predictors.

In multivariate modeling the choices are to introduce race as a control (with its peculiar distribution) or to sort into subsets. Both strategies are followed here. First, some further multivariate visualizations are considered for dependent behaviors that carry a racial signal; second, some event count modeling is used to get at a fairly subtle class differential in the appeal of Percich and Conway; and third, Gary King's ecological inference software is used to obtain individual level estimates that may be compared with the cruder results from the aggregate data analyses; and finally, the predictive success of the count models is assessed.

The vote for Jones in the Comptroller's race shows the power of differentiating candidates by race. In Figure 19 the Jones mobilization is plotted on marriage rate while conditioning on the over age 64 population and the racial percentage. The display illustrates the interaction between candidate's race, the conditioning variables, and the relationship between Jones support and marriage rates. In the high non-white areas the response of Jones' mobilization to the marriage rate is strongly positive and is perhaps slightly enhanced as the percentage of persons over 64 increases. In the white areas (the left column) all support for Jones is either extinguished or negative. In the non-white middle row category there appears to be some interaction between the panel relationships and age. The shingles are sorted numerically from low to high so the numerical values of the shingle conditions organize the overall display like a graph, not a table (read from left to right from bottom to top). With this convention the lower left and upper right cells are frequently informative. Young whites are located in the lower left cell and old non-whites in the upper right cell. If being married motivates the young whites to participate it is to vote for the white candidates, not Jones. Similarly, marriage is conducive to support for Jones in areas with high proportions of non-whites and a large proportion of older adults.

The pattern of interactions, indicated by the changing slopes of the Loess smoothed curves in Figure 19, is induced by the racial organization of the politics involved. If the figure reported the results of an experiment analysts might celebrate. For these aggregate data, pretty as the slopes may be, the fundamental lesson is that at least two different populations are displayed and it might be more reasonable to isolate those populations. For example, if Conway's vote is analyzed with the same scheme a similar pattern is obtained, although not as dramatic as that for Jones (see Figure 20) once more indicating that separate analysis could be profitable. In Figure 20 Conway's support disappears in the high non-white condition and is only slightly attenuated in the middle non-white condition. The middle racial category, constructed from quantiles of percentages, actually has about a 60 to 40 split of whites over non-whites which perhaps accounts for the very uniform appearance of Figure 20. Marriage and race predict Conway's support but the proportion of older persons appears as unimportant. It seems
reasonable in light of Figures 19 and 20 to examine candidate turnout visually in the extremes of mostly white and mostly non-white.

[Insert Figure 20 about here.]

The turnout for Jones in non-white areas can be visualized by similar Trellis plots of his mobilization on the marriage rate while varying conditioning plots. It turns out that there is a relatively strong interaction between the response of the Jones turnout to marriage rates and household income. When other conditioning variables are joined with household income not much variation in patterning is evident. A typical plot is set out in Figure 21 where the conditioning shingles are household income and neighborhood stability. Low levels of income suppress the response of Jones mobilization to marriage rates and neighborhood stability has minimal effect, although stability appears to increase the overall level of support for Jones. Moderate and high levels of income clearly enhance the response of mobilization to marriage rates. A number of other shingles were used in conjunction with household income and the plots are all very similar to Figure 21.

[Insert Figure 21 about here.]

The situation in the white areas is more complicated because there are two white candidates each receiving substantial support. Fully exploring the plots for Percich and Conway in the white areas and then pursuing all three candidates in the mixed areas (and carrying out a similar campaign for the School Board election) can be set aside in favor of some basic multivariate modeling. Of central interest here is the supposedly differential class appeals of the three candidates for Comptroller. Observers generally agree that Jones made appeals across the city and that this was translated into some, very modest, support among whites, probably from those with higher levels of education. Percich and Conway were regarded as coming from, and appealing to, different bases of white support in the Democratic party. Percich was viewed as a candidate closer to the working class and Conway was viewed as a middle to upper class candidate. (Recall Percich’s father had been Comptroller but Conway’s father had been the mayor.) Both candidates had been active in Democratic party politics and each had organized support from some party members - pieces of the regular party machine. Jones’ party base was in the North side Democratic machine of Congressman William Clay, and, at least on the North side, had substantial regular Democratic party support.

The possible variation in social class appeal can be proxied by several measures from the Census. We use three variants of education calculated on the adult population 25 years of age or older - percent high school graduates, percent completing or with some college, and the percent with some or completing graduate degrees. We expect the predictive role of these measures to follow a simple ordered scheme for Percich and Conway. For Conway, professional and graduate training should be more important than college training which in turn should be more important than high school graduation in furnishing him with support. For Percich the reverse should hold. Expectations regarding Jones’ class support are slightly more complicated. Non-whites support Jones in big numbers. What then matters is the extent to which educational achievement (lower in magnitude on the North side) drives voter participation. Thus, if they vote, they vote for Jones, but this means his support from the educational groups should be proportional to achievement - the effects should be similar in order to Conway.
The School Board election, perhaps more strongly than the Percich and Conway competition, has an apparent class based appeal. The Four for Kids slate was well educated, gender mixed, and racially mixed - a classic liberal assemblage of candidates. The opposition slate, for neighborhood schools, was reasonably viewed as standing against the integrationist Four for Kids slate if not actually right wing. Neighborhood schools, probably, was translated by that slate as standing for no more bussing. Hence, a wide gap between the well educated and the not so well educated can be anticipated for this election with Macke gaining support from the bottom (high school) and Davis from the top (graduate and professional). For the School Board election, and also the Comptroller’s race, it would be surprising if turnout for candidates was not responsive to all three measures of education since education is a common predictor of participation. We do not anticipate negative effects from these sources for any candidate in any race. Thus it is the order of the magnitude of the coefficients (and the dispersion of the estimates) that is of greatest interest, although negative effects remain possible.

This brings us to the second strategy of assessing turnout using a multivariate statistical model. The model we use is a negative binomial model treating the votes for a candidate as what they surely are, counts. Several control variables - adult population frequency, percent non-white, neighborhood stability, and the marriage rate - in addition to the three education measures. It is worth keeping in mind that these crude aggregate census measures are mutually exclusive and share only modest amounts of common variation. (The correlations are -0.35 between high school and college, -0.51 between high school and graduate and professional, and +0.56 between college and graduate and professional.) These basic predictors were used for the five individual candidates across the two elections where the response is measured as a count of votes for the candidate. Model results are tabled in the appendix.

The issue to be examined is the set of education measure coefficients and their error variance. The models were estimated in STATA using Gary King’s CLARIFY software (King 19xx) and kernel density estimates of the relevant coefficients are summarized graphically here based on 1,000 simulations for each parameter. The results of the simulations for Conway and Percich are presented in Figures 22 and 23. The modal values of the three distributions are ordered as expected but the distributions are additionally instructive. Figure 22 shows that high school graduates apparently did not contribute much to Conway’s support (a coefficient of zero is certainly defensible) but both college and graduate/professionals did. Furthermore, the magnitude of effects for these latter two sources of support are distinct - almost no overlap in the densities. To the extent that these education measures proxy the social class appeal of Conway he emerges as having middle and upper class appeal as a candidate. By contrast (see Figure 23) Percich had little appeal for either college persons or graduate/professionals - the dispersion for both is substantial and zero is close to the center of the simulations. The distribution of the simulations for the high school graduates coefficient, by contrast, is substantially removed from zero. The overall inference to be drawn from Figures 22 and 23 is that there is a class structure to the voter support obtained by the two white candidates in the Comptroller’s race.

The results of the simulations for Jones are given in Figure 24. The densities for the three coefficient simulations show less overlap than for Conway or Percich. For Jones, college voters and graduate/professional voters apparently provide a differentiated source of support and, just as for Conway, the graduate/professional coefficient has the highest modal value. No modal value is negative in these simulations.
for Conway, Percich, or Jones. The evidence from the figures is consistent with expectation and no modal values are negative.

[Insert Figure 24 about here.]

Turning to the School Board election, the pattern of simulated coefficients for Davis (Four for Kids slate) is consistent with the liberal image of this candidate (see Figure 25). The densities are quite narrow, all three are effectively bounded away from zero, and the graduate/professional coefficient distribution stands by itself well separated from the other two distributions. The Four for Kids slate appealed across all educational levels, and the ordering of the modes is consistent with expectations.

[Insert Figure 25 about here.]

The opposition slate, measured here by the opposition candidate Macke, provides a sharp contrast. The mode for the graduate/professional coefficient simulations is below zero, although the distribution is dispersed. The other two simulation modes are ordered as expected. The portion of the population who generally turnout at the highest rate is almost surely the graduate and professional population. It is striking that in a model for the mobilization of Macke voters, that the graduate/professional measure carries a negative, if not statistically crisp, coefficient (see Figure 26).

[Insert Figure 26 about here.]

It is plausible that the graduate and professional population lives in more concentrated pockets than would the high school graduates. The graduates and professionals are smaller in numbers than high school graduates and they have more money to invest in the housing market. Hence, it is likely that for, say, the two white candidates on the South side, the spatial organization is different for each in an interpretable fashion. That possibility can be directly assessed by spatial correlograms based on Moran's I, and the relevant comparison is set out in Figure 27 for calculations restricted to the white areas. The patterns are distinctive and might have been anticipated. High school graduates are more numerous and more widely distributed and the correlogram for Percich registers those conditions in the gradual fading of the spatial organization of his support. By contrast, the spatial reach of Conway's support disappears beyond a second neighborhood remove. The spatial analytics march with the count model coefficient orderings.

[Insert Figure 27 about here.]

These aggregate measures of levels of education are taken from basic Census categories. It is perhaps surprising that these measures pick up the expected class differentiation of voter support with such fidelity. In these aggregate data the class signal, as a measured covariate, is surprisingly robust and supports prior expectations in an orderly fashion. It remains to compare these basic results in additional ways. First, the results of these analyses can be compared with direct estimates of classes of individual behavior (ecologically estimated) using King's EI algorithm (King 1997, King and Benoit 2000). Second, the negative binomial model results can be evaluated in terms of the agreement between observed and predicted values, the spatial organization surviving in the residuals visualized analytically as Moran's I correlograms, and the
residuals visualized as shaded (choropleth) maps. Finally, a smart map can be 
exhibited giving an example visually displaying the original spatial organization of the 
turnout, the spatial organization of the residuals from the model, the scatter of observed 
on predicted values, and the spatial correlogram for the two maps, in one compressed 
figure.

King's algorithm for ecological inference is used here to first estimate the turnout 
of the whites and non-whites in each election, and second to estimate, based on these 
turnout estimates, the mobilization for the candidates of interest as well as the general 
mobilization in each election. In principle it is possible to use these estimates in 
separate applications of the event count model to assess the predictive power of the 
covariates in the event count model for racial subsets based on the EI estimates. Given 
the extremes of racial distribution (and reasonable space limitations for this paper) only 
the aggregate data modeling results are reported below. But what do the EI estimates 
show about race and mobilization?

The overall turnout estimates obtained from EI are reported in Table 4 along with 
standard errors for both elections. The table also subsets the results estimated for all 
areas for the three distinct sub-areas by the use of logical flags. (Separate EI estimates 
were obtained for the three areas as well. These estimates are comparable to those 
obtained by sub-setting the combined area estimates except in those conditions where 
the vote for a candidate was miniscule or the very low frequencies in the racial minority, 
e.g., Macke's turnout on the North side among whites. In keeping with the spirit of EI - 
use all the information you can get - only the combined precinct estimates are reported 
here.) In the mixed areas the table shows a reduced level of participation on the part of 
both non-whites and whites. This is consistent with two propositions about mechanisms 
of socially and environmentally mediated information on the behavior of citizens. The 
larger information environment in the mixed areas is racially ambiguous and hence may 
not be as strongly reinforcing when racial voting cues are present as would be the 
reinforcement in homogeneous areas. Also, in mixed areas, in social interactions with 
political content, when political disagreement is encountered, and to the extent that race 
is correlated with candidate support, a non-homogeneous re-sampling of socially 
mediated political cues is likely (Huckfeldt and Sprague 1995; McPhee with others1963). 
Both processes enhance ambiguity in the information arriving to the citizen. The 
magnitudes of differences are small, but if real, imply large numbers of votes - especially 
important in close elections like the Comptroller's race.

Another interpretation of the patterns can be obtained (if even the suspect 
estimates are trusted) by appealing to the proposition that minorities may turn into 
themselves for social support when they are decidedly small - effectively creating a more 
homogeneous atmosphere of socially mediated political cues (Coleman 1964; Finifter 
1974). Thus, non-whites in white areas and whites in non-white areas might be 
expected to enhance their participation rates from such a mechanism. The pattern in 
Table 4 is consistent with this interpretation as well. Isolated and very tiny minorities 
may find reinforcement from this or, alternatively give in to the majority signal. Either 
way their participation should be enhanced, although the partisan signal effects would be 
different for the two.
The overall turnout behavior, as estimated using EI, is also somewhat more dispersed for whites than for non-whites. Kernel density traces for whites and non-whites are displayed in Figure 28 for the School Board election based on the precinct point estimates. In this election the mean participation for whites (see Table 4) is slightly higher than that for non-whites. Figure 28 shows that it is also more spread out in the population of precincts. And the raw numbers show about ten thousand more votes in the South side than the North side in this School Board non-partisan election. An example, perhaps, of small differences in individual level propensities producing large differences upon aggregation.

The School Board election carried racial signals: Davis for non-whites and Macke for whites. Non-whites simply did not vote for Macke and Davis apparently had at least some appeal across all areas. As Table 5 shows, perhaps eight percent of whites voted for Davis but the non-white estimate for Macke is less than one percent. These EI estimates are consistent with visualizations. A simple map is compelling on this score (see Figure 29). The map distribution shows the enormous skew to the South side in Macke support and the lack of support on the North side, just as the EI estimates indicate.

The map in Figure 29 for Macke support provides a second example of extreme spatial organization, similar to that for the non-white population distribution which Macke's support of course reflects. A correlogram is given in Figure 30. The magnitudes of coefficients are not quite as high as for race (see Table in appendix) but they approach those levels and the spatial structure fades slowly across the neighborhoods. The vivid picture in the map and correlogram portray the obvious - the racial distribution and its correlation with like and dislike for Macke.

It is time to wind things up by displaying the count model results. The spatial distribution of turnout in elections is highly predictable. This is true for overall turnout and also for mobilization for particular candidates. The patterns of results are the same for candidate mobilization of adults and for overall turnout in each of the two elections. The overall turnouts fit somewhat less well than the candidate mobilization models. We report the results for one candidate, Jones, as typical of all the analyses. The numerical details of the estimated models are in the appendix. The regressors are made up of the total adult population, the three education or class measures, the percent married, neighborhood stability, and the percent non-white. The data are over-dispersed and the negative binomial is used accordingly. An additional parameter capturing the over-dispersion is thus also estimated. A basic display of observed on predicted is given in Figure 31.

There are three features of the figure probably worth pointing out. First, there are many (mostly white) precincts where Jones obtained low numbers of votes. These
appear to be well predicted. Second, the scatter shows increasing variance as the predicted values increase. This is consistent with the particular (and usual) parameterization for the negative binomial where the variance is linear in the mean. Third, the scatter is not wildly divergent from the fitted Loess curve - the swarm is reasonably bunched around the curve.

In spite of the relatively good fit the model falls short statistically in the behavior of the deviance residuals. The observed distribution is badly shaped - a large number of observations are near zero. The residuals on the response scale are obviously heteroscedastic and in fact have long tails on both ends of the distribution. The deviance residuals are not as strongly normally distributed as one would like. These three distributions are visualized in Figure 32 by histograms, box-plots, density plots, and qqnormal plots. The qqnormal plot for the response residuals can be usefully compared with the qqnormal plot for the deviance residuals. The lower tail of the deviance residuals is approximately normal in shape but the upper tail is long. The response scale residuals depart strongly from normal showing a long tail on both the low and high ends of the distribution. The statistical evaluation of parameters depends on the normality of the model deviance. Is it close enough? We do not know. Running from top to bottom on the histograms or box-plots tells the modeling story. Starting with a distribution with a bizarre shape, the response residuals produce two long tails, and the deviance residuals have one markedly long tail. Further model specification is beyond the current effort but one might hope that either some new measures or some clever transformations might make the qqnormal plot for the deviance settle down all along the line. The model defends itself well enough in terms of crude predictive power as Figure 31 shows.

[Insert Figure 32 about here.]

An alternative strategy for evaluating model performance relies on the spatial underpinning of the data. If the predictors adequately model the central tendency for each precinct what should be left is random error and this random error ought to be randomly distributed spatially. Put another way, the residuals should exhibit no spatial patterning. Does this condition hold for these Jones mobilization data? Figure 33 supplies a map of the original Jones vote support and Figure 34 casts the residuals onto a second map. The two figures are indeed different. The original vote (Figure 33) shows obvious spatial pattern, while the residuals (Figure 34) look mixed up - precisely. It appears that the errors in prediction are indeed random and free of spatial structure, i.e., the spatial units are independent in the response residuals. This independence is justification for treating the t-values from the model estimates with some respect.

[Insert Figure 33 and 34 about her.]

The spatial independence achieved in the residuals can be shown quite dramatically with a pair of spatial correlograms based on Moran's I - one for the original vote and one for the residuals. That display is set out in Figure 35. The lack of structure in the model residuals is striking. The demographic predictors, a handful of usual suspects, have done very well in driving the spatial structure out of the map (to the margins). This lack of structure in the residuals holds for all the other candidates as well. For the overall turnout in the two elections a very slight pattern remains in the residuals but magnitudes are miniscule. The display shows that a spatially anchored
phenomenon has been transformed to a random distribution by means of successfully isolating some covariates of turnout.

[Insert Figure 35 about her.]

These components can be assembled in a smart map that displays the geographic representations and the analytic graphs in one place. A first attempt to do this set out in Figure 36. The scale is unsatisfactory for the analytic graphs but all that is displayed in Figure 36 is taken directly from Figures 31, 33, 34, and 35 which the reader is invited to study for the gritty detail.

There are some tentative conclusions we draw from these analyses. Overall turnout can be predicted satisfactorily with a set of plausible predictors. On the original scale of the turnout response (number of votes per precinct) scatter-plots show high agreement between observed and predicted values from count models. The scatter of observed on fitted values appears the same for the School Board election and the Comptroller's primary.

A politically more interesting characterization of turnout can be obtained through disaggregation. When these overall turnout distributions are disaggregated to specific candidates, visual analysis reveals that the voting behavior arises from at least two distinct populations. Geographic displays (maps) of the racial gradient across the city when compared with voting behavior gradients across the city implicate race as the basis of these groupings. Count models fitted to the disaggregated candidate votes (including a measure for race as a predictor) also perform well in terms of good agreement between observed and predicted values. In fact, the agreement for the separate candidate models is somewhat higher than for either election's total vote model performance.

In the count models, measures of class structure based on education tallies from the Census behaved in systematic fashion and with considerable statistical sharpness. The evidence from the education coefficients in the models supports the notion that, in particular in the School Board election, there was a marked social class difference in the voter response to the two candidates.

Some support for the effects of racial context on individual behavior emerge from the EI estimates. The EI estimates suggest that the context that is most likely to be ambiguous both as a surrounding environment and in social interaction - the mixed areas - attenuates participation by both non-whites and whites. This is most strikingly shown in the estimates for whites when white turnout for Macke in the white areas (and in the non-white areas) is compared with white support for Macke in the mixed areas.

Two geographic analysis procedures proved particularly useful - choropleth maps and spatial correlograms. Choropleth maps of race and of the vote distributions, either counts or normed to some base, highlighted the spatial distribution of covariates and the response behaviors of interest. Spatial correlograms provided quantitative measures of the spatial organization present in these maps. These same procedures were applied to the distributions of residuals from the models providing a means of evaluating the extent to which independence of observations was achieved as a result of the modeling process. These geographic procedures indicated that the count models did a good job
of extracting systematic central tendencies leaving residuals with spatial structure of little magnitude and maps of residuals without obvious visual spatial organization.
Figures and Tables follow in order of mention in the text.
Table 1. Comparing correlations in the precinct data set (N=384) with those in the block group data set (N=546).

The following correlations are for precincts.

Correlation matrix
(ops=384)

<table>
<thead>
<tr>
<th></th>
<th>Income</th>
<th>Stability</th>
<th>Poverty</th>
<th>Unemploy.</th>
<th>Over 65</th>
<th>Married</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability</td>
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<td>1.0000</td>
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<td></td>
<td></td>
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<td>Poverty</td>
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<td>-0.1201</td>
<td>1.0000</td>
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</tr>
<tr>
<td>Unemployment</td>
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<td>0.7571</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 65</td>
<td>0.1994</td>
<td>0.2245</td>
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<td>-0.3347</td>
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</tr>
<tr>
<td>Married</td>
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<td>0.4588</td>
<td>-0.5744</td>
<td>-0.5106</td>
<td>0.1280</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

*************************************************************************************************

*************************************************************************************************

The following correlations are for block groups

Correlation Matrix.
(ops=546)

<table>
<thead>
<tr>
<th></th>
<th>Income</th>
<th>Stability</th>
<th>Poverty</th>
<th>Unemploy.</th>
<th>Over 65</th>
<th>Married</th>
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</thead>
<tbody>
<tr>
<td>Income</td>
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<td>Poverty</td>
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<td>Unemployment</td>
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<tr>
<td>Over 65</td>
<td>0.1162</td>
<td>0.2389</td>
<td>-0.3403</td>
<td>-0.1855</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>0.6016</td>
<td>0.3308</td>
<td>-0.4527</td>
<td>-0.4527</td>
<td>0.2025</td>
<td>1.0000</td>
</tr>
</tbody>
</table>
Figure 1. Turnout on neighborhood stability for the Comptroller’s Democratic primary contest.

All areas.
Figure 2. Turnout and two conditioning shingles.  

All areas.
Figure 3. Loess smoothers from Figure 2 with data support suppressed.

All areas.
Figure 4.

All areas.
Figure 5. Four for Kids slate candidate Davis.

All areas.
Figure 6. Opposition slate candidate Macke.

All areas.
Figure 7. Histogram of Non-white percentage by precincts.

All areas.
Table 2. Cutting points for the non-overlapping categories displayed in Figure 8.

<table>
<thead>
<tr>
<th>Intervals:</th>
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<th>max</th>
<th>count</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.7485046</td>
<td>38</td>
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<tr>
<td>0.781250</td>
<td>1.8779373</td>
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<td></td>
</tr>
<tr>
<td>1.980202</td>
<td>4.5402985</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>4.551369</td>
<td>10.9235382</td>
<td>39</td>
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<tr>
<td>10.970871</td>
<td>28.9805298</td>
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<td>62.248322</td>
<td>94.5652161</td>
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<td>94.771240</td>
<td>98.4848480</td>
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<tr>
<td>98.517998</td>
<td>99.2966003</td>
<td>39</td>
<td></td>
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<tr>
<td>99.307961</td>
<td>100.0000000</td>
<td>38</td>
<td></td>
</tr>
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</table>
Figure 8. A ten interval shingle for percent non-white.

All areas.
Non-overlapping race shingle.
Figure 9. Non-white percentage distribution by precincts.

Non-white percentages for precincts. Cutting points at 10% and 90%.
Figure 10. Non-white spatial correlograms.

All Areas
Spatial correlograms for non-white percent. Precinct coverage.

Table 3. Non-white correlogram values for all areas for contiguity matrices 1 through 10. Precinct coverage. N=384.

[1] "Tue Feb 29 10:47:54 2000 Moran's I and spatial lags returned for coverage "wp8" and vector pcnwo189"

<table>
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<th>No.</th>
<th>Moran's I</th>
<th>Spatial Correlation</th>
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</thead>
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<tr>
<td>1</td>
<td>0.8955664</td>
<td>0.9418188</td>
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<td>2</td>
<td>0.8651265</td>
<td>0.9352130</td>
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<tr>
<td>3</td>
<td>0.8304343</td>
<td>0.9335075</td>
</tr>
<tr>
<td>4</td>
<td>0.7720917</td>
<td>0.9287724</td>
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<td>5</td>
<td>0.6859247</td>
<td>0.9060988</td>
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<td>6</td>
<td>0.5768841</td>
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<td>7</td>
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<td>9</td>
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</tr>
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<td>10</td>
<td>-0.3175760</td>
<td>-0.5728852</td>
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</table>
Figure 11. Spatial correlograms for total Comptroller's contest turnout.

All Areas
Correlograms for Comptroller's election turnout.

Figure 12. Spatial correlograms for total School Board election turnout.

All Areas
Spatial correlograms for total turnout School Board election.

Figure 13. Comptroller's contest turnout.

Comptroller's race turnout quantiles. Cutting points at 16% and 22%. First order Moran's $I = +0.10$
Figure 14. School Board election turnout.

School Board turnout quantiles.
Cutting points at 19% and 27%.
First order Moran’s I =  +0.29
Figure 15. Three areas for analysis. White, non-white, and mixed.

Three precinct sets for analysis, white areas, non-white areas, and racially mixed areas. Theoretical cutting points are 10% and 90% non-white.
Figure 16. Moran's I in three precinct subsets. Comptroller turnout.
Figure 17. Moran's I in three precinct subsets. School Board turnout.
Figure 18. Turnout, neighborhood stability, and race.

All Areas with one conditioning shingle. The shingle is for percent non-white and there is no overlap between categories. The top ninth starts above 99 percent.
Figure 19. Jones mobilization on marriage rate. Conditioned by race and over 64.
Figure 20. Conway mobilization on marriage rate. Conditioned by non-white and over 64.
Figure 21. Jones mobilization on marriage. Conditioned by household income and neighborhood stability.
Figure 22. Education predictors for Conway.

Peaks left to right: high school, college, graduate and professional

Simulated coefficient values for education measures
Conway - Comptrollers Race
Figure 23. Education predictors for Percich.

Peaks left to right: college, graduate and professional, high school

Simulated coefficient values for education measures

Percich - Comptrollers Race
Figure 24. Education predictors for Jones.

Peaks left to right: high school, college, graduate and professional
Figure 25. Education predictors for Davis.

Peaks left to right: high school, college, graduate and professional
Figure 26. Education predictors for Macke.

Peaks left to right: graduate and professional, college, high school

Simulated coefficient values for education measures

Macke - School Board Race
Figure 27. Moran's I correlograms for Percich and Conway on the South side (white areas).
Table 4. EI estimates of turnout by race for two elections.

Turnout by race for the two elections, School Board (1991) and Comptroller (1989) reported by subarea of the city and for the city as a whole. Estimates obtained from EZI. Proportions are of voting age population with standard deviations.

<table>
<thead>
<tr>
<th>Area</th>
<th>Racial Grouping</th>
<th>School Board Election</th>
<th>Comptroller Election</th>
</tr>
</thead>
<tbody>
<tr>
<td>White areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=144</td>
<td>White</td>
<td>0.29 (.12)</td>
<td>0.21 (.09)</td>
</tr>
<tr>
<td></td>
<td>Nonwhite</td>
<td>0.23 (.05)</td>
<td>0.23 (.05)</td>
</tr>
<tr>
<td>Mixed areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=119</td>
<td>White</td>
<td>0.19 (.11)</td>
<td>0.16 (.11)</td>
</tr>
<tr>
<td></td>
<td>Nonwhite</td>
<td>0.19 (.07)</td>
<td>0.20 (.07)</td>
</tr>
<tr>
<td>Nonwhite areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=121</td>
<td>White</td>
<td>0.25 (.09)</td>
<td>0.19 (.07)</td>
</tr>
<tr>
<td></td>
<td>Nonwhite</td>
<td>0.23 (.06)</td>
<td>0.22 (.06)</td>
</tr>
<tr>
<td>All areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=384</td>
<td>White</td>
<td>0.25 (.12)</td>
<td>0.19 (.09)</td>
</tr>
<tr>
<td></td>
<td>Nonwhite</td>
<td>0.22 (.06)</td>
<td>0.22 (.06)</td>
</tr>
</tbody>
</table>

The means are from the point estimates from EZI for each precinct. The observations are not weighted by within precinct estimation error. The standard errors are for the distributions of these point estimates. All precincts are included in the estimation of the means and the standard errors, hence the standard errors are increased from that source. The standard errors computed in this fashion are just slightly smaller than the standard errors reported in EZI.

There are very few nonwhites in the white areas and very few whites in the nonwhite areas. We would not trust the estimates for these two groups in these areas.
Figure 28.

High peak is nonwhite, Low peak is white

Turnout by race for School Board Election
Table 5. EI estimates of turnout for Davis and Macke in the School Board election.

Turnout by race for each candidate, Davis and Macke, by subarea of the city and for the city as a whole in the School Board election, St. Louis, 1991. Estimates obtained from EZI. Proportions of voting age population presented with standard deviations in parentheses.

<table>
<thead>
<tr>
<th>Area</th>
<th>Racial Grouping</th>
<th>Davis</th>
<th>Macke</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<tr>
<td>White areas</td>
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<td>144</td>
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<tr>
<td>N=144</td>
<td>White</td>
<td>0.06 (.03)</td>
<td>0.23 (.10)</td>
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<tr>
<td></td>
<td>Nonwhite</td>
<td>0.22 (.06)</td>
<td>0.01 (.002)</td>
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<tr>
<td>Mixed areas</td>
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<td>119</td>
<td></td>
</tr>
<tr>
<td>N=119</td>
<td>White</td>
<td>0.10 (.10)</td>
<td>0.08 (.05)</td>
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<tr>
<td></td>
<td>Nonwhite</td>
<td>0.18 (.06)</td>
<td>0.008 (.006)</td>
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<tr>
<td>Nonwhite areas</td>
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<td>121</td>
<td></td>
</tr>
<tr>
<td>N=121</td>
<td>White</td>
<td>0.09 (.04)</td>
<td>0.16 (.10)</td>
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<tr>
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<td>Nonwhite</td>
<td>0.22 (.06)</td>
<td>0.008 (.005)</td>
</tr>
<tr>
<td>All areas</td>
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<td>N=384</td>
<td>White</td>
<td>0.08 (.06)</td>
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<td>Nonwhite</td>
<td>0.21 (.06)</td>
<td>0.009 (.004)</td>
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The means are from the point estimates from EZI for each precinct. The observations are not weighted by within precinct estimation error. The standard errors are for the distributions of these point estimates. All precincts are included in the estimation of the means and the standard errors, hence the standard errors are increased from that source. The standard errors computed in this fashion are just slightly smaller than the standard errors reported in EZI.

There are very few nonwhites in the white areas and very few whites in the nonwhite areas. We would not trust the estimates for these two groups in these areas.
Figure 29. Macke votes in space.

Macke vote frequencies by five quantiles.

Macke Vote Frequencies
0 - 8
9 - 16
17 - 78
79 - 159
160 - 300
Figure 30. Macke support. Correlograms.

Macke's spatial structure.
Figure 31. Jones observed and predicted from count model. Loess smoother imposed.
Figure 32. Jones data. Observed, response scale residuals, and deviance residuals. One-way plots.
Figure 33. Jones support distribution map.

Jones vote frequencies by three quantiles. Comptroller election.
Figure 34. Jones residuals from count model map.

Jones residual errors in prediction from the count model.
Figure 35. Observed and residual correlograms using Moran's I.

All areas. Jones votes.

Jones turnout. Moran's I.

Jones Residuals. Moran's I.
Figure 36. Jones votes. Count model.

Jones Turnout. Observed map, residual map, correlograms, and observed on predicted

Jones Mobilization
- 1 - 16
- 17 - 94
- 95 - 287

Jones residuals
- -137 to -7
- -7 to 4
- 4 to 89
REFERENCES

Anselin, Luc, Anil K. Bera, Raymond Florax, Mann J Yoon  

Anselin, Luc.  

Anselin, Luc and Raymond Florax.  
1994  "Small sample properties of tests for spatial dependence in regression models: some further results"  Research Paper 9414. Regional Research Institute. West Virginia University, Morgantown, WV.

Anselin, Luc  

Anselin, Luc and Sheri Hudak  

Anselin, Luc  
1998 SpaceStat, a program for the analysis of spatial data. Regional Research Institute, West Virginia University, Morgantown, WV.

Anselin, Luc  

Benoit, Kenneth and Gary King  

Bullock, Charles S., III  
Cleveland, William S.

Cleveland, William S.

Coleman, James S.

DeLorenzo, Lisa, Carol Kohfeld, and Lana Stein
1997 “The impact of cross-racial voting on St. Louis primary election results.” *Urban Affairs Review* volume 33 (no. 1) 120-133.

Eisinger, Peter K.

Finifter, Ada

Hastie, T.J. and R. J. Tibshirani

McPhee, William N.

Huckfeldt, Robert and John Sprague

Jackson, Byran O.
1987 “The effects of racial group consciousness on political mobilization in American cities.” *Western Political Quarterly* volume 40 (December) 631-646.

King, Gary
King, Gary, Michael Tomz, and Jason Wittenberg.

Kohfeld, Carol and Lisa DeLorenzo

Kohfeld, Carol and John Sprague
1995  “Racial context and voting behavior in one-party urban political systems.” Political Geography volume 14 (No. 6/7) 543-569.

Kohfeld, Carol and Lana Stein

Lublin, David Ian, and Katherine Tate

McCullagh, P. and J. A. Nelder

McPhee, William N.

Metz, David Haywood, and Katherine Tate

St. Louis Chapter American Statistical Association

Sonenschein, Rapheal J.
Straits, Bruce C.  

Terkildsen, Nayda  

Timpone, Richard J.  

Tomz, Michael, Jason Wittenberg, and Gary King.  
http://gking.harvard.edu/

Tufte, Edward R.  

Wainer, Howard  

Williams, Linda F.  

Wolfinger, Raymond E. and Steven J. Rosenstone  
Software

Several different software packages have been essential for the data analyses in this paper. Two general packages, S-PLUS and STATA, were used for most of the statistical work. Gary King's CLARIFY and EZI were used. Maps were done in ArcView (ESRI). SpaceStat (Luc Anselin) was used for the initial processing of ArcView shape files that resulted in starting first order contiguity matrices. Moving between package formats was aided by StatTransfer (Steve Dubnoff, Circle Systems). Some graphs were made more or less successfully with the limited graphic capability of STATA. The more complicated graphs were made in S-PLUS, many of them utilizing the sub-set of techniques known as TRELLIS graphics. Spatial statistics routines for the spatial correlograms were written in S-PLUS and checked against Anselin's SpaceStat procedures. In the end tables and graphs were imported into WORD. The operating systems were Windows95 and Windows98.
Appendix

Mostly numerical detail.
Table A11. Numerical details for correlograms in Figure 11. Overall Comptroller's contest turnout.

```r
ejunk <- fnmorcor("wp8",pctrncmp)
[1] "Tue Feb 29 20:43:08 2000 Moran’s I and spatial lags returned for coverage "wp8" and vector pctrncmp"
> junk

<table>
<thead>
<tr>
<th></th>
<th>morani</th>
<th>sptlcor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.10142709</td>
<td>0.20056716</td>
</tr>
<tr>
<td>2</td>
<td>0.12170407</td>
<td>0.29696082</td>
</tr>
<tr>
<td>3</td>
<td>0.10542036</td>
<td>0.31075066</td>
</tr>
<tr>
<td>4</td>
<td>0.07318006</td>
<td>0.23478641</td>
</tr>
<tr>
<td>5</td>
<td>0.04991495</td>
<td>0.21883389</td>
</tr>
<tr>
<td>6</td>
<td>0.01129240</td>
<td>0.06460667</td>
</tr>
<tr>
<td>7</td>
<td>0.03347954</td>
<td>-0.17300077</td>
</tr>
<tr>
<td>8</td>
<td>0.05979378</td>
<td>-0.24649577</td>
</tr>
<tr>
<td>9</td>
<td>0.07204307</td>
<td>-0.23814604</td>
</tr>
<tr>
<td>10</td>
<td>0.10595067</td>
<td>-0.31769347</td>
</tr>
</tbody>
</table>
```
Table A12. Numerical details for correlograms in Figure 12. Overall School Board turnout.

junk <- fnmorcor("wp8",pctrned)

> junk

    morani     sptlcor
   1  0.2915647 0.4527795
   2  0.3182264 0.5459527
   3  0.2817913 0.5448000
   4  0.2275141 0.4872406
   5  0.1851718 0.5054219
   6  0.0922755 0.3356491
   7 -0.0068488 -0.0286608
   8 -0.0791255 -0.2787608
   9 -0.1316879 -0.3694130
  10 -0.1809854 -0.4182539
Correlogram numerical detail for Conway and Percich vote combined.

```r
> aaconper <- fnmorcor("wwpcw",l(cmpctwht$pcconvap+cmpctwht$pcpervap))
> aaconper

Thu Mar 2 04:27:57 2000 Moran's I and spatial lags returned for coverage "wwpcw" and vector l(cmpctwht$pcconvap + cmpctwht$pcpervap)

> aaconper

 morani      sptlcor
1 0.32261904 0.50490829
2 0.22454244 0.43043229
3 0.06843649 0.16116222
4 0.03295397 0.11699384
5 -0.01943801 -0.06568734
6 -0.06351703 -0.17182492
7 -0.15185150 -0.36793590
8 -0.16908093 -0.40371595
9  0.03597311  0.04929686
10    NA -0.23426563
```
Correlogram for table above - Conway + Percich.

Conway and Percich mobilization combined. Spatial correlograms.


Numerical detail for model use to construct Figure 23.

Negative Binomial Regression results used as the basis for simulations using Clarify for Percich Vote in the Comptroller Race, St. Louis City, 1989.

Negative binomial regression

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting Age Population</td>
<td>.0009307</td>
<td>.000094</td>
</tr>
<tr>
<td>Percent High School</td>
<td>.0108663</td>
<td>.003935</td>
</tr>
<tr>
<td>Percent College</td>
<td>.0015364</td>
<td>.0029451</td>
</tr>
<tr>
<td>Percent Graduate and Professional</td>
<td>.0039004</td>
<td>.0054687</td>
</tr>
<tr>
<td>Percent Nonwhite Voting Age Population</td>
<td>-.0210635</td>
<td>.0007883</td>
</tr>
<tr>
<td>Stability</td>
<td>.0100052</td>
<td>.0023856</td>
</tr>
<tr>
<td>Married</td>
<td>.0083936</td>
<td>.0033172</td>
</tr>
<tr>
<td>Constant</td>
<td>1.950868</td>
<td>.2138897</td>
</tr>
</tbody>
</table>

/lnalpha | -2.093967 | 1.074264 |

alpha | .1231974 | .0132347 | 9.309 |

Likelihood ratio test of alpha=0: chi2(1) = 667.54 Prob > chi2 = 0.0000
**Numerical detail for model underlying Figure 22.**

Negative Binomial Regression results used as the basis for simulations using Clarify for Conway Vote in the Comptroller Race, St. Louis City, 1989.

Negative binomial regression

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting Age Population</td>
<td>.0010311</td>
<td>.000088</td>
<td>11.712</td>
</tr>
<tr>
<td>Percent High School</td>
<td>.0030717</td>
<td>.0036264</td>
<td>0.847</td>
</tr>
<tr>
<td>Percent College</td>
<td>.0081994</td>
<td>.0027147</td>
<td>3.020</td>
</tr>
<tr>
<td>Percent Graduate and Professional</td>
<td>.028046</td>
<td>.0050384</td>
<td>5.566</td>
</tr>
<tr>
<td>Percent Nonwhite Voting Age Population</td>
<td>-.0181768</td>
<td>.0007257</td>
<td>-25.046</td>
</tr>
<tr>
<td>Stability</td>
<td>.0047304</td>
<td>.0021443</td>
<td>2.206</td>
</tr>
<tr>
<td>Married</td>
<td>.0150744</td>
<td>.0031329</td>
<td>4.812</td>
</tr>
<tr>
<td>Constant</td>
<td>2.133668</td>
<td>.1978945</td>
<td>10.782</td>
</tr>
</tbody>
</table>

---

/lnalpha | -2.115133 | .0957281

---

alpha | .1206172 | .0115465 | 10.446

---

Likelihood ratio test of alpha=0: chi2(1) = 1189.81 Prob > chi2 = 0.0000
**Numerical detail for model underlying Figure 24.**

Negative Binomial Regression results used as the basis for simulations using Clarify for Jones Vote in the Comptroller Race, St. Louis City, 1989.

Negative binomial regression

<table>
<thead>
<tr>
<th>Number of obs = 384</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR chi2(7) = 759.98</td>
</tr>
<tr>
<td>Prob &gt; chi2 = 0.0000</td>
</tr>
<tr>
<td>Log likelihood = -1645.1137</td>
</tr>
<tr>
<td>Pseudo R2 = 0.1876</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jones vote</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting Age Population</td>
<td>0.0009613</td>
<td>0.0000926</td>
<td>10.386</td>
</tr>
<tr>
<td>Percent High School</td>
<td>0.0028129</td>
<td>0.0036867</td>
<td>0.763</td>
</tr>
<tr>
<td>Percent College</td>
<td>0.0168917</td>
<td>0.0029765</td>
<td>5.675</td>
</tr>
<tr>
<td>Percent Graduate and Professional</td>
<td>0.0387403</td>
<td>0.0054568</td>
<td>7.099</td>
</tr>
<tr>
<td>Percent Nonwhite Voting Age Population</td>
<td>0.0262545</td>
<td>0.0007635</td>
<td>34.387</td>
</tr>
<tr>
<td>Stability</td>
<td>0.0034536</td>
<td>0.0023345</td>
<td>1.479</td>
</tr>
<tr>
<td>Married</td>
<td>-0.0069324</td>
<td>0.0031333</td>
<td>-2.092</td>
</tr>
<tr>
<td>Constant</td>
<td>1.133779</td>
<td>0.1979115</td>
<td>5.729</td>
</tr>
</tbody>
</table>

\[-\ln\alpha\] = -1.895611 \pm 0.0899365

\[\alpha = 0.1502265 \pm 0.0135109\]

Likelihood ratio test of alpha=0: \[\chi^2(1) = 1912.08\] \[\text{Prob > chi2} = 0.0000\]
Numerical detail for model underlying Figure 25.

Negative Binomial Regression results used as the basis for simulations using Clarify for Davis Vote in the School Board Election, St. Louis City, 1991.

Negative binomial regression

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting Age Population</td>
<td>.001083</td>
<td>.0000746</td>
<td>14.510</td>
</tr>
<tr>
<td>Percent High School</td>
<td>.0060226</td>
<td>.0029141</td>
<td>2.067</td>
</tr>
<tr>
<td>Percent College</td>
<td>.0157089</td>
<td>.0023474</td>
<td>6.692</td>
</tr>
<tr>
<td>Percent Graduate and</td>
<td>.042455</td>
<td>.004373</td>
<td>9.709</td>
</tr>
<tr>
<td>Professional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Nonwhite Voting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Population</td>
<td>.0164266</td>
<td>.0006017</td>
<td>27.303</td>
</tr>
<tr>
<td>Stability</td>
<td>.0051119</td>
<td>.0018453</td>
<td>2.770</td>
</tr>
<tr>
<td>Married</td>
<td>.0048553</td>
<td>.0027048</td>
<td>1.795</td>
</tr>
<tr>
<td>Constant</td>
<td>1.486247</td>
<td>.160748</td>
<td>9.246</td>
</tr>
</tbody>
</table>

---

/lnalpha | -2.323003 | .0846767

---

alpha | .0979789 | .0082965 | 11.810

Likelihood ratio test of alpha=0: chi2(1) = 2190.77 Prob > chi2 = 0.0000
Numerical detail for model underlying Figure 26.

Negative Binomial Regression results used as the basis for simulations using Clarify for Macke Vote in the School Board Election, St. Louis City, 1991.

Negative binomial regression

Number of obs = 384

LR chi2(7) = 914.51
Prob > chi2 = 0.0000

Log likelihood = -1571.2075 Pseudo R2 = 0.2254

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting Age Population</td>
<td>0.0010157</td>
<td>0.0000879</td>
</tr>
<tr>
<td>Percent High School</td>
<td>0.010856</td>
<td>0.0035984</td>
</tr>
<tr>
<td>Percent College</td>
<td>0.0031429</td>
<td>0.002681</td>
</tr>
<tr>
<td>Percent Graduate and Professional</td>
<td>-0.0084495</td>
<td>0.005018</td>
</tr>
<tr>
<td>Percent Nonwhite Voting Age Population</td>
<td>-0.0284682</td>
<td>0.007196</td>
</tr>
<tr>
<td>Stability</td>
<td>0.0125723</td>
<td>0.0021508</td>
</tr>
<tr>
<td>Married</td>
<td>0.0147885</td>
<td>0.0030184</td>
</tr>
<tr>
<td>Constant</td>
<td>2.442274</td>
<td>0.1962976</td>
</tr>
</tbody>
</table>

/lnalpha | -2.195483 | 0.1027739 |

alpha | 0.1113048 | 0.0114392 | 9.730 |

Likelihood ratio test of alpha=0: chi2(1) = 1435.22 Prob > chi2 = 0.0000